CHILD SEAT

The invention relates to a child seat for a vehicle seat of a motor vehicle in accordance with the precharacterizing clause of patent claim 1.

Solutions are already known from the prior art for securely fastening child seats to a vehicle seat.

There is thus, for example, the "ISOFIX system", in which two connectors fastened to the child seat engage with snap fasteners around two anchorages which are fastened to the vehicle floor between the seat back and seat surface.

DE 197 22 096 A1 discloses a child seat which has its own belt system and which can be fastened to a vehicle seat of a motor vehicle by means of a three-point seat belt on the vehicle seat side. The child seat is equipped with a tightening device into which a shoulder belt part of the three-point seat belt of the motor vehicle is inserted. In the event of an impact, the tightening device, which is integrated in the child seat, is activated, so that, during a deceleration of the vehicle body, the child seat can immediately respond.

However, a prerequisite for an optimum restraining action of the child in the child seat is that any belt slack of the belt system integrated into the child seat is minimized.

It is therefore the object of the invention to provide a child seat, the belt system of which can be tightened preventatively and/or crash-actively.

According to the invention, a child seat is proposed which can be fastened to a vehicle seat by means of a three-point seat belt. The three-point seat belt is equipped as standard with a tightening device which can be accommodated, for example, in the belt retractor or in the belt buckle. The three-point seat belt is coupled to the belt system of the child seat, so that a shortening of the three-point seat belt during an impact causes the belt system of the child seat to be tightened. The three-point seat belt is fastened to the child seat in such a manner that, in the event of a head-on impact, a possible tendency of the child seat to rotate about an ISOFIX fastening, resulting from the connection below the center of gravity of the child seat, can be reduced or completely eliminated. By means of the coupling of the three-point seat belt to the belt system of the child seat, the crash-active or preventative belt tightening of the three-point seat belt, which belt tightening is generally provided in any case, is transmitted to the belt system of the child seat without a separate belt-tightening unit having to be installed for the child seat.

In one preferred embodiment of the invention, the three-point seat belt is connected to the belt system of the child seat via a coupling element. In this case, the coupling element is designed in such a manner that the tensile forces introduced by the three-point seat belt are reinforced.

The coupling element may be a belt strap, the first free end of which is connected to the three-point seat belt. The second free end of the belt strap is connected to the belt system of the child seat, thus ensuring that force will be transmitted by the three-point seat belt to the belt system of the child seat.

The three-point seat belt can be guided about an upper and a lower belt deflection on the child seat. The lower belt deflection is designed in such a manner that, when the three-point seat belt is tightened, the belt loop guided about the upper and lower belt deflection is shortened and a tensile force can therefore be passed on to the belt strap.

The lower belt deflection can advantageously be designed as a clip which is mounted movably on a lower transverse strut. The upper belt deflection may be designed as an upper transverse strut for deflecting and supporting the three-point seat belt, with it being possible for the belt force applied by a belt-tightening device to be harmonized via the friction on the upper transverse strut.

A stable construction of a child seat can be achieved by the upper transverse strut being connected to the lower transverse strut by two side cheeks.

The installation of the child seat therefore turns out to be very simple: first of all, the buckle latch of the three-point seat belt is inserted into the belt buckle of the vehicle. The shoulder belt part of the three-point seat belt is then guided over the upper transverse strut and threaded into the clip of the lower transverse strut. When the belt is threaded in, the child seat can be anchored by its ISOFIX connectors on the ISOFIX anchorages on the vehicle.

One end of the belt strap may be fastened to the clip, so that, when a belt force acts on the clip, the belt strap is likewise acted upon, so that a shortening of the child seat belt system, which is connected to the belt strap, can therefore take place.

The belt system of the child seat may comprise a harness belt, with it being possible for a Y-distributor for the harness belt to be provided in the back rest. The second end of the belt strap can be fastened to this Y-distributor.

Optimum introduction of force into the belt system of the child seat is ensured by guiding the belt strap via deflecting bars. Care should be taken in the guidance of the belt strap to ensure that a low-friction arrangement of the deflecting bars is selected in order to keep frictional losses of the belt strap minimal.

In addition, a tensioning pulley can be provided through which the belt strap is guided, and which can be held displaceably in a linear guide. As a result, more belt material can be deflected, and the belt can therefore be shortened manually for the purpose of adjusting it to the child.

In one preferred embodiment, the tensioning pulley is connected to a manually operable belt strap of the belt system. As a result, when the tensioning pulley is displaced manually, the manually operable belt strap and subsequent latching enable the belt supplying the belt system of the child seat to be adjusted and matched to the child in a simple manner.

In addition to the tightening device, the child seat can have a force-limiting system which has means for limiting the maximum belt force. A force-limiting system of this type is described in DE 101 07 874 A1. The full contents of the disclosure in DE 101 07 874 A1 are hereby incorporated into the disclosure of the patent application.

The force-limiting threshold of the maximum belt force can advantageously be dependent on the belt length or belt position set, since children's weight depends on their height.

As already mentioned, the child seat can additionally be fastened to the supporting structure of the vehicle via a fastening system, for example the ISOFIX system. The threading of the three-point seat belt through the upper and lower struts together with the ISOFIX system constitutes a particularly user-friendly solution.

One advantageous embodiment of the invention will be explained below with reference to the drawing, in which:

fig. 1 shows a child seat in a perspective view from the rear,

fig. 2 shows a child seat according to fig. 1 with a three-point seat belt,

fig. 3 shows a child seat according to fig. 1 in a perspective view from the front,

fig. 4 shows a guide of the belt strap according to fig. 3 in a view obliquely from above,

fig. 5 shows a guide of the belt strap according to fig. 4 in a view from the rear, and

fig. 6 shows a guide of the belt strap according to fig. 4 in a view from the side.

Fig. 1 illustrates a child seat 1 with a seat shell 2. From the seat shell 2 part of a back rest 3, into which an upper transverse strut 4 and a lower transverse strut 5 are introduced, is visible. The two transverse struts 4 and 5 are connected to each other by two side cheeks 6 and 7.

Accommodated in the back rest 3 is a Y-distributor 8, to which harness belts (not illustrated) are fastened and are guided through openings 9 onto the front side of the back rest 3. The Y-distributor 8 is of U-shaped design and has, at its lower end 10, a slot 11 through which a belt strap 12, which is designed as a coupling element, is guided.

A clip 13 which is connected to the belt strap 12 is mounted on the lower transverse strut 5. The clip 13 is of U-shaped design and introduces a belt force into the belt strap 12 when the loop of the three-point seat belt 14 between the upper transverse strut 4 and clip 13 is shortened in the arrow direction A. In this case, the belt force with the clip 13 increases to twice the amount because the three-point seat belt 14 in conjunction with the clip 13 constitutes a block-and-tackle principle with the transmission ratio 1:2. That is to say, when the three-point seat belt 14 is retracted by the distance x with the force y, the distance x/2 is deployed with the force 2y at the clip 13.

As is apparent from fig. 2, a three-point seat belt 14 on the vehicle seat can be fitted into the clip 13, so that the three-point seat belt 14 is deflected about the upper transverse strut 4. The three-point seat belt 14 therefore runs from its upper connecting point 14a (not illustrated) between the upper transverse strut 4 and the back rest 3 to the clip 13, from there back to the transverse strut 4 and then to its lower connecting point 14b. A means of securing against the three-point seat belt 14 slipping out may additionally be provided on the clip 13.

In the illustrated position of the three-point seat belt 14, the buckle latch 15 thereof is inserted into a belt buckle 16 arranged next to the vehicle seat. The lap belt extending from the buckle latch 15 is not specifically illustrated and extends approximately from level with the bottom of the child seat to that side of the child seat 1 which lies opposite the belt buckle 16. In the lower region of the child seat 1, connectors 17 are provided for fastening it to the ISOFIX anchorages on the vehicle.

The illustration in fig. 3 shows the child seat 1 in a perspective view from the front, with the belt strap 12 being guided via a deflecting device 18 arranged in the lower region of the child seat 1.

In fig. 4, the guiding of the belt strap 12 in the deflecting device 18 is explained in more detail. The deflecting device 18 comprises two runners 19 and 20 which are arranged in a mirror-inverted manner with respect to each other and are connected to each other by deflecting bars 21a to 21e. In addition, a tensioning pulley 22 is provided and is held in a linear guide 23 in a manner such that it can be displaced manually parallel to the longitudinal axis L of the child seat 1. Buckles 24 and 25, which are connected to each other by means of a strut 26, are coupled on both sides of the tensioning pulley 22. A belt strap 27 belonging to the belt system of the child seat 1 is fastened to the strut, is guided via the deflecting bar 21e onto the seat side of the child seat 1 where it keeps the tensioning pulley 22 in the designated position by means of a standard latching device.

Fig. 5 and fig. 6 show the guiding of the belt strap 12 according to fig. 4, with the deflection of the belt strap 12 by the clip 13 (not illustrated) via the tensioning pulley 22 as far as the Y-distributor 8 (likewise not illustrated) being apparent. The tensioning pulley 22 can be moved to and fro in the linear guide 23 in accordance with the arrow direction B. The manual matching of the belt system of the child seat 1 to the individual requirements of the child with regard to belt slack after the child has been placed in is realized via the displacement of the tensioning pulley 22 by the belt strap 27 and the standard latching device (not illustrated). The further forward the tensioning pulley 22 is positioned in the linear guide 23, the tighter will the belt of the child seat bear against the child.

The force transmission of a preventative or crash-active tightening by the three-point seat belt 14 on the vehicle takes place via the activation of the clip 13, for example by means of the shoulder belt being tightened (for example preventatively), or the belt buckle being tightened (for example crash-actively). In both cases, the belt is retracted. This results in a shortening of the belt loop between the upper transverse strut 4 and the clip 13. In this case, the belt force at the clip 13 doubles. The clip 13 passes on the belt force F via deflecting bars 21a to 21e and the tensioning pulley 22 to the Y-distributor 8 and therefore to the harness belt of the belt system, which belt is tightened as a result. Furthermore, the tightening of the three-point seat belt 14 results in a retaining function of the child seat 1 at the force application point of the upper transverse strut 4. This retaining function reduces or prevents the tendency of the child seat to rotate about the lower ISOFIX connection to the connectors 17.

The force-limiting means can be shifted in a simple manner within the child seat 1 by, for

example, a bending plate being integrated between the belt strap 27 and the tensioning pulley 22 or a similarly mounted, plastically deformable deformation element being integrated in the belt strap 12. In addition, a level of force appropriate for a child can be set by integration of the force-limiting device which has already been mentioned and is disclosed in DE 101 07 874 A1.

The child seat 1 can be used both in the case of vehicles with or without an ISOFIX fastening system.

Without an ISOFIX fastening system, the child seat 1 is only fixed on the vehicle seat by the fastening by means of the three-point seat belt 14. If a transmission of the belt force acting from the three-point seat belt 14 to the belt system of the child seat 1 is to take place at the same time, additional belt guides are necessary in the child seat, but these will not be described in greater detail here.

By means of the ISOFIX fastening system, the child seat is additionally coupled to the vehicle seat by means of the three-point seat belt 14.

If the three-point seat belt on the vehicle has a pyrotechnic belt tightener, the belt system of the child seat is tightened in the event of a crash.

If, in addition, a preventative protective system is provided for the three-point seat belt on the vehicle, the belt system of the child seat can be tightened crash-actively and preventatively.

In both cases, the belt loop on the upper transverse strut 4 enables the child seat 1 to be supported against the tendency of the child seat to rotate about the ISOFIX connection, which is also referred to as top tether fastening.